



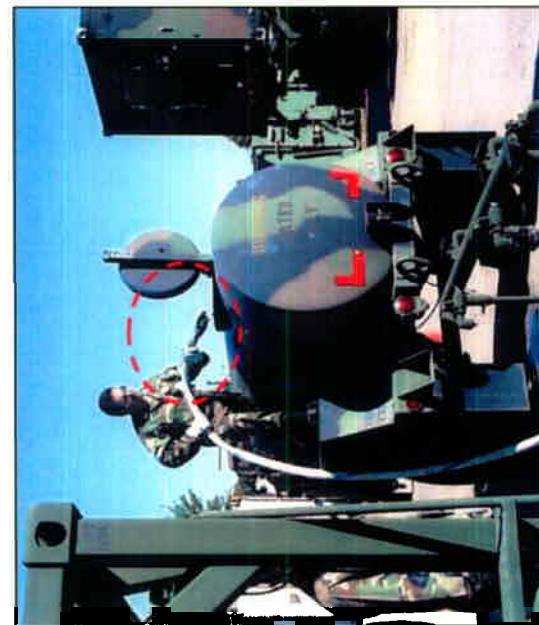
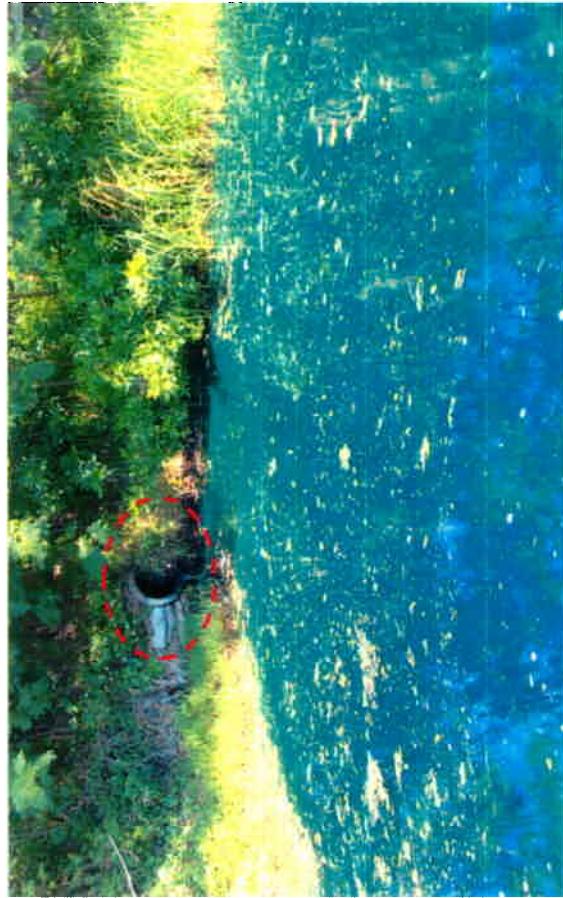
PETROLEUM & WATER

TACOM

*Mobility and Firepower
for America's Army*



Real Time Detection of Chemical and Biological Threat Contaminants in Water



James Dusenbury, Ph.D.
Science & Technology Team Leader

14 October 03

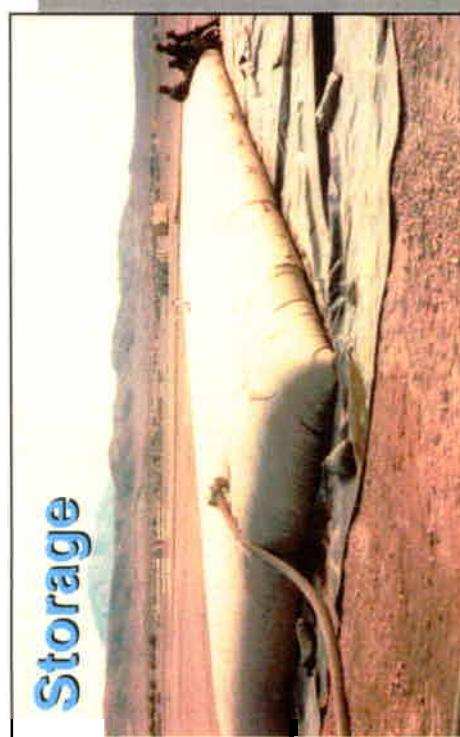
Report Documentation Page			<i>Form Approved OMB No. 0704-0188</i>	
<p>Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.</p>				
1. REPORT DATE 14 OCT 2003	2. REPORT TYPE N/A	3. DATES COVERED -		
4. TITLE AND SUBTITLE Real Time Detection of Chemical and Biological Threat Contaminations in Water			5a. CONTRACT NUMBER	
			5b. GRANT NUMBER	
			5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) James Dusenbury, Ph.D.			5d. PROJECT NUMBER	
			5e. TASK NUMBER	
			5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) USA TACOM 6501 E 11 Mile Road Warren, MI 48397-5000			8. PERFORMING ORGANIZATION REPORT NUMBER 13958	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSOR/MONITOR'S ACRONYM(S) TACOM TARDEC	
			11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited				
13. SUPPLEMENTARY NOTES The original document contains color images.				
14. ABSTRACT				
15. SUBJECT TERMS				
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 14
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified		
19a. NAME OF RESPONSIBLE PERSON				



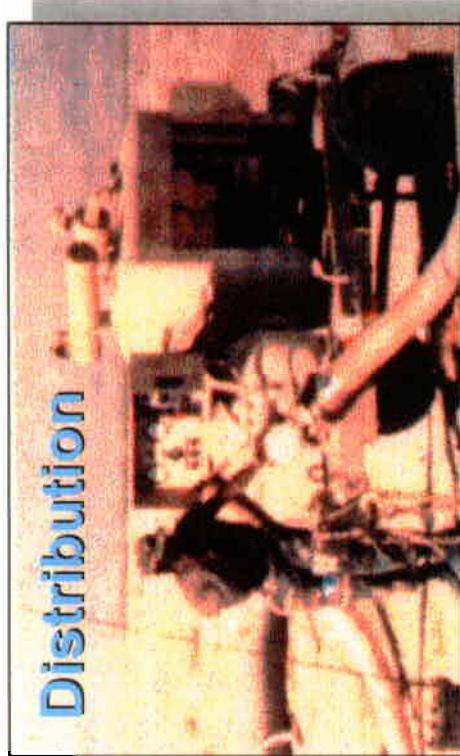
ARMY'S MISSION AREAS



PETROLEUM & WATER



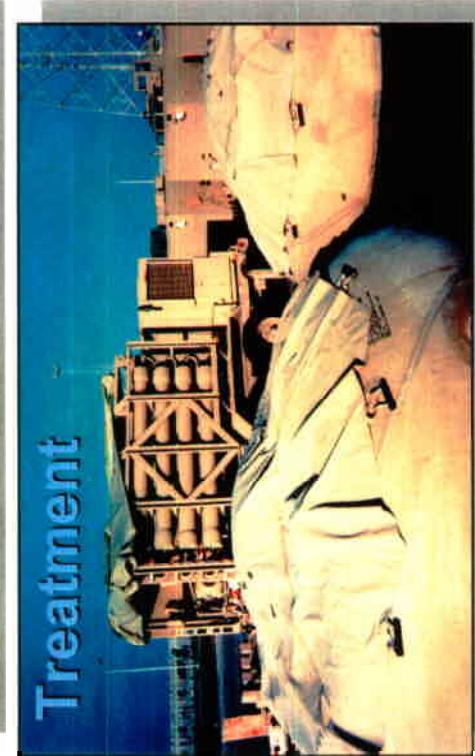
Storage



Distribution

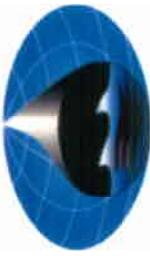


Quality



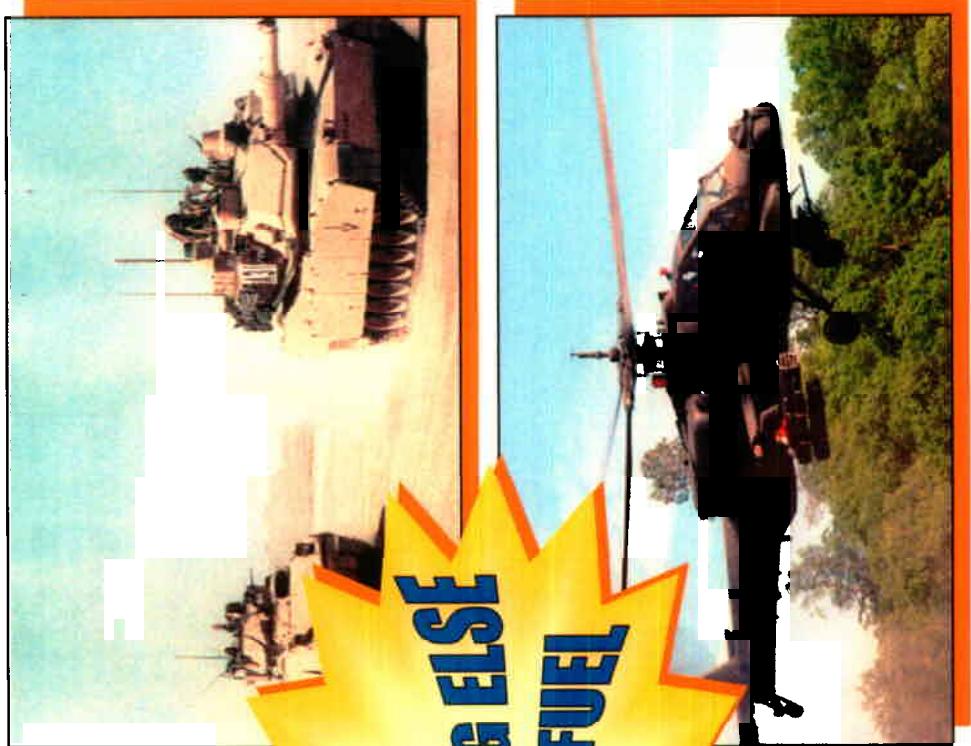
Treatment

Importance of Water



PETROLEUM & WATER

THE WORLD'S
ULTIMATE WEAPON
RUNS ON WATER.



**EVERYTHING ELSE
RUNS ON FUEL**





PETROLEUM & WATER
RESEARCH INSTITUTE

LABORATORIES



Fuels and Hydraulic Fluids



Oils and Lubricants



Water Chemistry



Instrumentation



EQUIPMENT



Reverse Osmosis
Test Area (L) and
Reverse Osmosis
Controls (R)



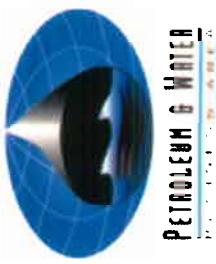
Fuel
Handling
Test Area
Water and
Wastewater
Components
Test Area



Program Objective

DUAL USE

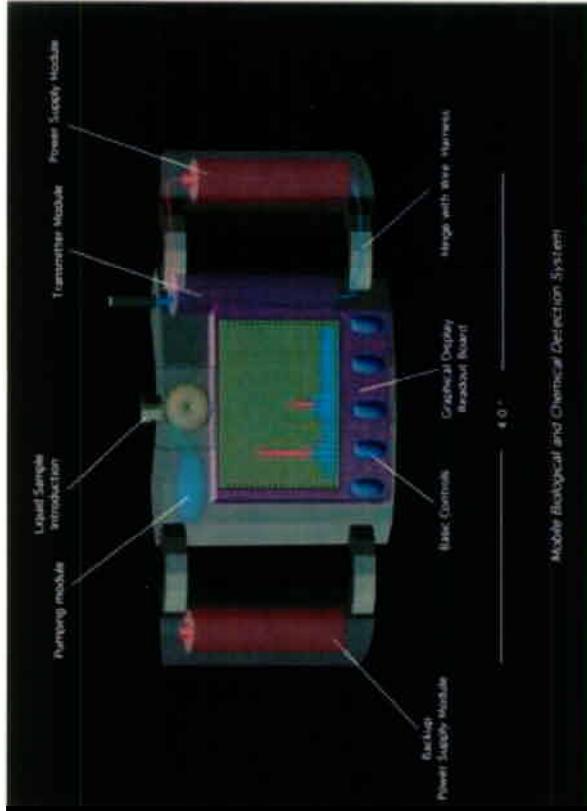
Develop field hardened hand-held /
in-line water quality monitoring
equipment to protect troops and
civilians from biological and
chemical threats in real time





Requirements

- Real time results (5-15 minutes)
- Handheld device
- Minimize/ self powered
- Minimize false positive and false negatives
- Minimize complexity (no specialized training)
- Minimize logistical requirements
- Maximize sensitivity
- Minimize costs.
- The awardee will be required to deliver a demonstrator to the government.



Approach

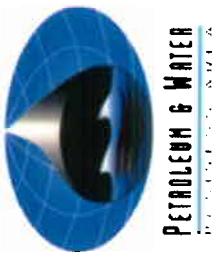
- One (1) major contract for \$2.5M to develop hand-held detector based on Micro-Electro-Mechanical Systems (MEMS) platform.
- Three (3) contracts for \$100K each to investigate feasibility of novel concepts that can be integrated into a MEMS platform.

Bacterial Species
<i>Escherichia coli</i>
<i>Escherichia coli</i> <i>O157:H7</i>
<i>Pseudomonas</i> <i>aeruginosa</i>
<i>Yersinia enterocolitica</i>
<i>Bacillus cereus</i>
<i>Bacillus subtilis</i>
<i>Enterococcus faecalis</i>
<i>Listeria monocytogenes</i>
<i>Staphylococcus</i>





Determining Beach Closings



- *E. coli* 126 per 100 ml
- Enterococci 33 per 100 ml.

- The Common techniques used to determine bacteria populations are slow.
 - Standard Method – plate counts
 - 48 hours (minimum) results, must be done at a biological laboratory
 - Modified plate counts – Dip slide
 - 24 hours results +/- 1 log

Metropolitan Beach Mount Clemens, Michigan



PETROLEUM & WATER

25. Advisories/Closings Reporting

Action Type:	Closing
Start Date:	09/26/2002
End Date:	09/30/2002
Total number of days posted:	5
Is this part of a general or area-wide advisory or closing?	No
Percent of this beach affected:	100 %

Source(s):	CSO, SSO, POTW, Septic systems, Boat discharge, Storm water runoff, Wildlife
------------	--

Reason(s):	Monitoring that revealed elevated bacteria levels
------------	---

Current Status



- 4 Contract Awards
- Follow on Funding
- Contract Deliverables
- Lab Verification

15th August 03

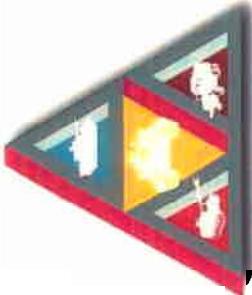
15th June 04

30th February 05

30th March 05

- Field Assessment and Insertion of Technologies

Related Work



Monitoring :

-ARDESTA- Develop basic water quality parameters on a chip

- Office of Naval Research (ONR)- Michigan State – indirect and direct electrochemical detection.

Sample Concentration:

-American Water Works Association (Awwa) Research Foundation funded RFP 2908 EXTRACTION METHODS FOR EARLY-TIME WARNING SYSTEMS FOR BIOLOGICAL AGENTS in the amount of 300k and currently a board is reviewing proposals from a recent RFP 2985 for an award in the amount of 300K for the same topic

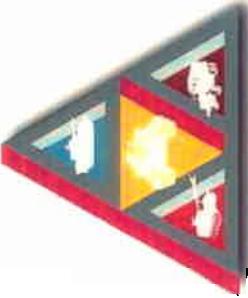
-Army Research Office (ARO)-Fluorescent Coated Filters for the Detection of Biological Warfare Agents in water.

-ONR-Foster-Miller- Dissolved Air Flotation, Concav, coagulant, and surface skimmer.

Participating Colleagues



- US Army Soldier, Biological & Chemical Command (SBCCOM)
- CHPPM
- AMEDDC&S
- Oakland County-Public Health Department
- Macomb County - Public Health Department
- Wayne County -Public Health Department
- St. Clair County -Public Health Department



Benefit

- Real Time Detection
- Cooperative effort between the local health departments and the military.
- Provide better detection tools to ensure the safety of the public and the soldiers.

